

Serial Number 10/053,275
Amendment Under 37 CFR§111
Reply to Office Action of October 6, 2004

REMARKS/ARGUMENTS

Reconsideration and withdrawal of the rejections set forth in the Office Action are respectfully requested.

By this Amendment, non-elected claims 14-22 have been canceled without prejudice to filing a divisional application thereon. Applicants confirm the election of the claims of Group 1 in response to the restriction requirement.

Dependent claims 23-29 have been added to define certain specific aspects of Applicants' invention. Claim 23 calls for a preferred solubility range (support for which appears, for example, at page 10, lines 24-25). Claim 24 calls for the crosslinking agent to be pendent to the polymer strand and claim 25 calls for a specific pendent group (support for which appears, for example, at page 5, lines 23-24). Claim 26 calls for the epoxy-reactive group to be certain specified groups (support for which appears, for example, at page 9, lines 5-9). Claim 27 calls for the polybutadiene to be reacted with maleic anhydride, which is part of claim 4. Claim 28 calls for the maleic anhydride to be reacted with a polyalkylene oxide (support for which appears, for example, at page 11, lines 9-12). Claim 29 calls for the maleic anhydride to be reacted with a methoxy polyethylene glycol, which is part of claim 4. Claim 30 recites that the adhesion promoter consists essentially of the polymeric strand of claim 1.

New independent claim 31 is a combination of claims 1, 3 and 4, with methoxy polyethylene glycol. Claims 32-37 are dependent, directly or indirectly, on claim 31. Claim 32 is similar to claim 6. Claim 33 is similar to claim 13. Claim 34 is similar to new claim 23. Claim 35 calls for the molecular weight of the polybutadiene (support for which appears, for example, at page 7, lines 9-11). Claims 36 and 37 call for the amount of maleic anhydride (support for which appears, for example, at page 15, line 29 to page 16, line 2).

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New independent claim 38 recites that the adhesion promoter consists essentially of the polybutadiene polymeric strand grafted with a maleic anhydride which is reacted with a methoxy polyethylene glycol, and styrene-butadiene-vinylpyridine terpolymer.

It is respectfully submitted that claims 1-13 and 23-38 are patentable and should be allowed.

Prior to discussing the rejections set forth in the Office Action, it is believed that it would be helpful to briefly review Applicants' invention.

The present invention is directed to adhesion promoters which are useful in composite materials that include rubber and polymeric fibers. Examples of such composite materials include polyester fiber reinforced rubber useful in tires, belts and the like. Heretofore, various attempts have been made to improve the adhesion between a polymeric fiber and a rubber composition.

One example of such attempts is the surface treatment of the fiber with a resorcinol-formaldehyde-latex (RFL), but such material may pose environmental and/or health concerns. To avoid the use of such material, it has been suggested to cover the fiber with an additional layer, or to use an acrylic resin, but such potential solutions have not been adequate to provide excellent bonding. It has been further suggested to use a maleinized polybutadiene, but this has relatively poor water solubility and consequently various hydroxides are required to form lattices and solutions in water.

Applicants have discovered, *inter alia*, that these problems can be overcome through the use of a polymeric strand which has an epoxy-reactive group (other than a phenolic hydroxyl group) and a crosslinking group capable of crosslinking the polymeric

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strand with a rubber in a crosslinking reaction, wherein the polymeric strand is water soluble in an amount of no less than 10g/l. Preferably, the polymeric strand is a polybutadiene that has been maleinized and wherein at least one carboxyl group of the maleic acid is esterified with methoxy polyethylene glycol.

In addition, Applicants have discovered that when a second polymer, preferably a styrene-butadiene-vinylpyridine, is included in the adhesion promoter, excellent adhesion to rubbers results.

Other aspects of the invention are set forth in the claims listed above and are more particularly discussed below with regard to the proposed rejections of the claims.

Next, each of the rejections will be discussed.

1. The Rejection of Claims 1-3 and 5-13 under 35 USC § 102 (e) As Anticipated by Pelton is Improper and Should be Withdrawn

(a) Pelton is Not an Effective Reference Against the Claims

Claims 1-3 and 5-13 stand rejected under 35 USC § 102 (e) as anticipated by U.S. patent publication 2002/0144779 A1 to Pelton (hereinafter "Pelton"). It is respectfully submitted that this publication is not an effective reference against the claims of the present application.

The present application has a filing date of January 17, 2002. On the other hand, Pelton was filed subsequent to Applicants' filing date, namely March 7, 2002. Thus it is clear that the Pelton application as published is not an effective reference against Applicants' earlier filed application under the Patent Statute.

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It is recognized that the published Pelton application claims to be a continuation-in-part of an earlier filed application (Serial No. 09/526,985, filed March 16, 2000, now abandoned). However, it has not been documented in the Office Action that the disclosure relied on in the published Pelton application in fact is supported by the earlier abandoned application.

It is incumbent on the Patent and Trademark Office to demonstrate that the portions of the disclosure of the published Pelton application have an effective filing date prior to the filing date of the instant application. The Office Action fails to provide any evidence that the disclosures relied on to reject claims 1-3 and 5-13 of this application are in fact fully supported in the parent application from which Pelton claims priority. Without such evidence, it is clear that the published Pelton application is not an effective reference against the claims of this application and accordingly any rejection based on the published Pelton application is improper.

Therefore, Applicants respectfully submit that the rejection of claims 1-3 and 5-13 as anticipated by Pelton must be withdrawn. Likewise, it is submitted that Pelton is not an effective reference against new claims 23-38, and they also should not be subject to any rejection over Pelton.

(b) Even if Pelton were an Effective Reference, Claims 1-3 and 5-13 are Patentable over Pelton

In the event that it is proven that Pelton is an effective reference against this application, it is respectfully submitted that Pelton does not anticipate the invention of claims 1-3 and 5-13.

Pelton is directed to an adhesive composition for adhering textiles to EPDM rubber. Pelton's composition requires a rubber latex of specified rubbers (e.g., a

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hydrogenated styrene-butadiene rubber). The composition further comprises an aqueous solution of a half-ester of maleinized liquid polybutadiene, which preferably is an isobutyl half-ester of maleinized polybutadiene. It is said that the combination of the rubber and the polybutadiene provides effective adhesion of the textile reinforcement to an EPDM rubber (page 1, paragraph [0011]). It is respectfully pointed out that Pelton does not describe any portion of the polybutadiene as having an epoxy-reactive group.

Importantly, Pelton fails to disclose a feature of claim 1, namely that the polymeric strand is water soluble in an amount of no less than 10g/l. As such, it is submitted that all of the features of claim 1 are not present in the applied reference, and thus an anticipation rejection is not supportable. Accordingly, it is respectfully submitted that claim 1 is not anticipated by Pelton and the rejection thereover should be withdrawn.

Dependent claims 2, 3 and 5-13 are similarly not anticipated by Pelton. Furthermore, Pelton does not disclose the specific terpolymer claimed in claim 6, namely styrene-butadiene-vinylpyridine. In the Office Action, the disclosure of Pelton at paragraph [0013] was relied upon as supposedly teaching the claimed terpolymer. However, it is respectfully submitted that this is not the case.

At the cited portion of Pelton, there is described the fact that his disclosed composition comprises a latex of hydrogenated styrene-butadiene rubber, carboxylated hydrogenated styrene-butadiene rubber, hydrogenated nitrile-butadiene rubber, carboxylated nitrile-butadiene rubber or chlorosulfonated polyethylene. This latex is blended with the half-ester of maleinized liquid polybutadiene.

The cited portion of Pelton goes on to state the composition may further contain latex blends with one or more materials, and a total of at least 15 separate polymers and rubbers are mentioned. Pelton continues with the general phrase "and copolymers and terpolymers thereof". Applicants respectfully submit that this disclosure of Pelton cannot

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be fairly read to suggest the specific terpolymer claimed in claim 6, namely styrene-butadiene-vinylpyridine. The disclosure of a myriad of generic materials onto which is further added a catch-all phrase that "copolymers and terpolymers" can be employed does not suggest to one skilled in the art that the specific terpolymer claimed in claim 6 is in fact disclosed in Pelton. It is clear that there is no specific disclosure in Pelton of the terpolymer claimed in claim 6, and it is improper to create a matrix from the generic disclosure of Pelton to in essence recreate what is being claimed in claim 6. Surely, if Pelton had any inkling of a styrene-butadiene-vinylpyridine terpolymer he would have specifically disclosed the same. The failure to do so is indicative that claim 6 is not anticipated by Pelton.

Therefore, it is respectfully submitted that claim 6 is further patentable over the disclosure of Pelton. Accordingly, it is submitted that claims 1-3 and 5-13 are not anticipated by Pelton and the rejection on such ground should be withdrawn.

With regard to the newly added claims, it is submitted that they likewise are not anticipated by (or obvious over) the disclosure of Pelton, at least for the same reasons as claim 1. In addition, the solubility range of claim 23 (and claim 34) is not disclosed in Pelton. Similarly, the location of the cross-linking group being pendent to the polymeric strand and such pendent group being a 1,2 vinyl microstructure in polybutadiene, as set forth in claims 24 and 25, are not shown by Pelton.

Also, the specific epoxy-reactive groups of claim 26 are not disclosed in Pelton, nor is the feature of claim 28 that the maleic anhydride is reacted with a polyalkylene oxide. And certainly, Pelton fails to show the methoxy polyethylene glycol of claim 29 (likewise as specified in claim 31). In addition, with respect to claim 30, Pelton requires a latex of, e.g., a hydrogenated styrene-butadiene rubber in addition to the half-ester maleinized polybutadiene, whereas claim 30 calls for the adhesion promoter to consist essentially of the polymeric strand.

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As pointed out above with respect to claim 6, the specific terpolymer of claim 32 is not disclosed in Pelton. Claim 31 is similar to claim 29 in calling for a methoxy polyethylene glycol and like claim 29 is likewise not anticipated by Pelton. Furthermore, the molecular weight range of claim 35 and the percent of maleic anhydride of claims 36 and 37 are not shown by Pelton.

Finally, claim 38 calls for the adhesion promoter to consist essentially of the polybutadiene and styrene-butadiene-vinylpyridine terpolymer, whereas Pelton also requires a hydrogenated styrene-butadiene rubber or the like and does not disclose the methoxy polyethylene glycol. Thus, claim 38 is also not anticipated by Pelton.

2. The Rejection of Claim 4 under 35 USC § 103 (a) As Unpatentable over Pelton in view of Hyde et al. is also Improper and Should be Withdrawn

It was stated in the Office Action that claim 4 was rejected over Pelton as applied to the other claims in view of Hyde et al., U.S.P. 6,497,919 ("Hyde"). It was stated that at paragraph [0024] Pelton teaches that his composition can optionally contain other well known additives including plasticizers in amounts employed by those skilled in the adhesive arts to obtain the desired consistency, appearance, reinforcing and uniformity of coating. It was further stated that Hyde teaches an adhesive blend comprising plasticizing agents of the type contemplated by Applicants such as methoxy polyethylene glycol, which do not phase separate when mixed with the resultant polymers. It was concluded that this statement of Hyde, together with the general level of skill and knowledge in the art, would have motivated the skilled artisan to modify the composition of Pelton by including a known additive such as a plasticizer. This, it was stated, would have rendered obvious the invention of claim 4.

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Applicants respectfully disagree with this ground of rejection.

(a) Pelton is Not an Effective Reference Against the Claims

As stated in Section 1 (a) above, Pelton is not an effective reference under 35 USC § 102 (e) and hence cannot be an effective reference under 35 USC § 103 (a). Accordingly, the rejection of claim 4 based on Pelton is improper and should be withdrawn.

(b) Even if Pelton were an Effective Reference, Claim 4 is Patentable
Patentable over Pelton

Assuming, arguendo, that Pelton is an effective reference against this application, it is submitted that claim 4 is in fact patentable over the proposed combination of references. This claim calls for the maleic anhydride of claim 3 to be reacted with a compound which is a methoxy polyethylene glycol, a monoamine terminated polyoxyalkylene and a monoalcohol terminated polyoxyalkylene.

The rejection recognizes that Pelton does not suggest such a reaction, and in fact the only product mentioned by Pelton is an isobutyl half-ester of maleinized liquid polybutadiene.

While it is true that at paragraph [0026] Pelton includes a standard statement that the composition can optionally include other well known additives including plasticizers, fillers, pigments, thickeners, dispersion agents, wetting agents, reinforcing agents and the like, there is no reason why one skilled in the art would chose any of these materials as a substitute for the isobutyl half-ester of maleinized liquid polybutadiene of Pelton.

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The Hyde patent is directed to an adhesive composition which is a blend of a hydrophilic pressure sensitive adhesive and a hydrophobic pressure sensitive adhesive. The hydrophilic component is the reaction product of a (meth)acrylate ester monomer, an acidic comonomer and a non-reactive plasticizing agent. Among the plasticizing agents are mentioned polyalkylene oxides, alkyl or aryl functionalized polyalkylene oxides, benzoyl functionalized polyethers and monomethyl ethers of polyethylene oxides. Among the specific materials mentioned at col. 7, lines 2-13 is a methoxypolyethylene glycol.

Firstly, it is submitted that Hyde is concerned with a pressure sensitive adhesive, whereas Pelton is not. Rather, Pelton is concerned with a rubber latex adhesive for adhering textiles to rubber. Moreover, while the adhesive of Pelton is based on a hydrogenated styrene-butadiene rubber or the like, the adhesive of Hyde is based on a (meth)acrylate ester polymer. There simply is no reason why one skilled in the art, looking to modify Pelton to add a plasticizer or other additive, would even consider looking at a disclosure in the pressure sensitive adhesive field, much less that of Hyde, or to a (meth)acrylate-based adhesive rather than a hydrogenated S-B rubber.

Hyde requires that the hydrophilic pressure sensitive adhesive not only includes the plasticizer (which is present in a minor amount) but major amounts of a (meth)acrylate ester monomer and a hydrophilic acidic comonomer. There is simply no reason why one skilled in the art, absent the improper use of Applicants' own disclosure, would dissect the composition of Hyde to only chose one part of the adhesive of Hyde's composition and somehow try to insert that component into the composition of Pelton.

In addition, in Applicants' invention the methoxy polyethylene glycol is reacted with the maleic anhydride to provide pendent groups which afford a particular water solubility to the polymeric strand (see, for example, page 10, lines 28-30). It is respectfully submitted that there is no teaching or suggestion in Hyde that the type of

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plasticizers disclosed therein are intended for reaction with maleic anhydride. Indeed, Hyde refers to the plasticizers as being non-reactive. Accordingly, there clearly is no suggestion in either Pelton or Hyde, in any combination, of formulating a polymeric strand with a maleic anhydride that is reacted with a methoxy polyethylene glycol or the like.

Certainly there is no suggestion in Hyde of substituting a methoxypolyethylene glycol for the isobutyl half-ester of Pelton. There is even less of a suggestion that the types of plasticizers mentioned by Hyde for pressure-sensitive adhesives would somehow be useful in the rubber-based compositions of Pelton. And, in fact, the plasticizers of Hyde are one component of a hydrophilic pressure sensitive adhesive so that even if one skilled in the art would be led to combine the references, a pressure sensitive adhesive would be substituted for the rubber-based adhesive of Pelton. It is submitted that the proposed composition is not one which a person having ordinary skill in the art would make and therefore claim 4 is indeed patentable over the proposed combination of references.

If the basis of the rejection, that any component of any adhesive composition can be freely substituted or added to any other adhesive composition, were proper, then no other adhesive formulations would be patentable. This clearly is not the proper statutory standard.

In addition, the rejection refers to "in combination with the general level of skill and knowledge in the art". It is respectfully pointed out that such level and knowledge have not been established by the Patent and Trademark Office and therefore cannot be used as a basis for this obviousness rejection.

Therefore, it is submitted that one skilled in the art would not look to the disclosure of Hyde to modify the adhesive of Pelton, and even if such person would do

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so, a fair interpretation of both references would not lead to the proposed selection of a portion of Hyde's composition into that of Pelton. As such, it is respectfully submitted that the Patent and Trademark Office has not made a prima facie showing that the invention of claim 6 is obvious over Pelton in view of Hyde. Thus, it is submitted that claim 6 is indeed patentable over Pelton in view of Hyde and the obviousness rejection should be withdrawn.

Furthermore, it is submitted that Applicants have demonstrated that the combination of the methoxy polyethylene glycol with a maleic anhydride in a polybutadiene strand results in an adhesion promoter which exhibits unexpected properties. The Examiner's attention is respectfully directed to the example at pages 18 and 19 of the instant specification. Whereas cords separately treated with an acid modified polybutadiene (coating 1) or a vinyl pyridine-butadiene-styrene latex (coating 2) exhibit adhesion to some degree, the combination of both of them (coating 6) provides unexpected improvement in the adhesive strength. That is, in Overfinish 1, for example, coating 1 had a peel strength of 8.3 pounds per inch and coating 2 had a peel strength of 8.2 pounds per inch. The combination of both coatings (coating 6) had a peel strength of 21.2 pounds per inch, which is vastly superior to that of the individual components and certainly not expected.

Therefore, even if it were somehow determined that the Office has made out a prima facie case of obviousness, it is respectfully submitted that this has been rebutted by the evidence of record. As a result, Applicants respectfully submit that claim 6 is indeed patentable over the combination of Pelton and Hyde and thus the 35 USC § 103 (a) rejection of the claim should be withdrawn.

With regard to the newly added claims, for the reasons mentioned above with respect to the anticipation rejection, it is respectfully submitted that these claims are also patentable over the proposed combination of Pelton and Hyde.

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3. Summary

In view of the above, it is respectfully submitted that claims 1-13 are indeed patentable and should be allowed. Likewise, it is submitted that claims 23-38 are also allowable. Therefore, withdrawal of all of the rejections and allowance of the application are most respectfully requested.

Should the Examiner believe that a discussion with Applicants' representative in any way advance the prosecution of this application, she is requested to telephone the undersigned.

Respectfully submitted,
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